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D. Walter Rasugu Omariba
University of Western Ontario

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by
D. Walter Rasugu Omariba

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email: dwomarib@uwo.ca

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Population Studies Centre
University of Western Ontario
London CANADA N6A 5C2

Abstract

There is a strong theoretical and empirical relationship between educational attainment and fertility behaviour. However, a fundamental question that has largely been neglected is the change in this relationship across cohorts resulting from differential improvement in educational opportunities for women over time and how it relates to fertility transition. Utilizing the 1998 DHS data from Kenya this study examines the differential effect of educational attainment on women's use of modern contraception and desire for cessation of childbearing across generations. The findings indicate that even after controlling for husband's education and other relevant factors, a woman's advanced education is positively associated with use of modern contraception. However, support for a similar hypothesis on a woman's desire for family limitation was only found among the youngest cohort of women. The results suggest that for Kenya's incipient fertility transition to be sustained the government needs to continue efforts to improve female education and supporting access to family planning among younger women.

Key Words: Fertility Preference, Family planning, Fertility transition, Contraception, Sub-Saharan Africa, Kenya

Introduction

Age is dynamic and as it relates to the cohort a person belongs has far reaching implications on diverse demographic behavior and other life-course events (Ryder, 1985; Riley, 1998). The effect of cohort on fertility behavior reflects the historical periods and socioeconomic, cultural and political contexts in which groups of women grew and were nurtured. Although the experiences of individual women may vary, the prevailing conditions in the society in which they grow could lead them to similar life experiences. For example, people who attain school going age when a country's education system is undergoing substantial growth and development could in the end have higher educational attainment than cohorts of a different period. It is in this context that formal education, which is an important measure of social change influencing attitudes and behavior could be considered in relation to fertility behaviour across cohorts. However, although fertility behavior analyses in sub-Saharan Africa have considered the effect of age (see, for instance, Cochrane, Khan and Osheba, 1990; Oheneba-Sakyi and Takyi, 1997; Uchudi, 2001) to our knowledge none have incorporated the cohort perspective and how its effect could be modified by socioeconomic factors.

Maternal education has been found to be the most significant determinant of fertility behavior and its effect in lowering the number of children a woman desires has been observed in a variety of settings (Caldwell, 1980; 1997; UN, 1987; Jejeebhoy, 1995; Uchudi, 2001). Studies further demonstrate that female education associates with lower fertility even after controlling for other factors that could mediate this relationship (UN, 1987; Weinberger, Lloyd and Blanc, 1989; Jejeebhoy, 1995; Caldwell, 1997; Kirk and Pillet, 1998). Notwithstanding the wealth of empirical evidence that female education

negatively associates with fertility desires in most developing countries, the negative effect of education on fertility is less pronounced in sub-Saharan Africa and the results are often inconsistent (Cochrane and Farid, 1986; 1990; Cleland and Rodriguez, 1988; Rodriguez and Aravena, 1991; van de Walle and Foster, 1990). The lack of strong correlation between education and fertility in sub-Saharan Africa as compared to other developing regions is attributed to a high desire for large families even among educated and urban women (Uchudi, 2001). However, female education levels in Africa, especially in Northern and sub-Saharan Africa are lower as compared to the other regions of the world (Martín, 1995; Kravdal, 2002). This has led some researchers to argue that the strong correlation between education and low fertility is a common finding in societies in which fertility limitation is already being practiced and in which a large a proportion of women have received education or have an opportunity to receive education (see, for example, Axinn, 1993).

Despite the low levels of education among sub-Saharan women, Kenya is one of the several exceptional countries in the region including Botswana, Ghana, Namibia, South Africa, Tanzania, Zambia, and Zimbabwe that have witnessed significant growth in female education. Since attaining self-rule from Britain in 1963, the government and its international development partners have supported women's education both to improve women's status and foster national development. Additionally, the reduction of fertility through promotion of the use of modern contraception and improvement of child health is a major plank in these development initiatives (Bledsoe, Johnson-Kuhn and Haaga, 1999). Using the percent aged 15-19 who have completed more than four years of primary education as a measure of mass schooling, Kenya has seen the percent

completing grade four grow from 42 percent in 1960 to 91 percent by 1998 with no gender differences in this measure (Lloyd, Kaufman and Hewett, 2000). Similarly, the proportion of literate females as percentage of total adult women population rose from 42.6 percent in 1970 to 73.5 percent in 1998 (UNESCO, 2000).

Little is also known on how education impacts women of different cohorts in relation to their fertility behaviour. Although education opportunities have been improving over time, the availability of these opportunities varied across the years. Consequently, women's educational attainment will vary depending on the educational opportunities available to them when they attained school-going-age and as they progressed through their school years. It is therefore imperative to assess the differential impact of education across generations as younger cohorts who have benefited more from the advance in education would significantly differ in their fertility behavior from older cohorts.

A further reason for considering cohort changes in fertility behavior is that Kenya's fertility decline commenced in the later half of the 1980s and continued in the 1990s (Caldwell, 1992; Robinson, 1992; Obungu, Kizito and Bicego, 1994), which suggests that it is younger women whose fertility desires could have changed and were therefore using family planning. However, in sub-Saharan Africa studies show that family planning acceptors are women who already have a high number of children (Bertrand et al. 1985; Bertrand et al. 1989; Bledsoe et al., 1994; Toroitich-Ruto, 2001) implying therefore that fertility levels are not affected much as younger women could still have higher number of children. If the desire for smaller families and adoption of family planning fertility behavior characterizes only older women and not the younger

then sustaining fertility decline could be difficult. Additionally, the onset of fertility decline coincided with the period of economic downturns and the introduction of economic restructuring policies which could have weakened the fertility-education relationship. Intuitively, this suggests that the differential fertility behavior across cohorts by education level might not be observed. Examining fertility behaviour across cohorts is therefore important in order to assess the possibility of sustenance of fertility transition. Consequently, this paper examines the effect of educational attainment on fertility behavior and assesses the manner of association across cohorts using data from Kenya.

Education and fertility behaviour: A theoretical framework

Although there is little agreement on the mechanisms through which formal education affects fertility, there is considerable empirical evidence that associates higher female education with lower fertility (Kasarda, 1986; Cochrane, 1990; Toroitich-Ruto, 2001). Kasarda et al. (1986) have argued that theories linking education and fertility fit within a status-enhancement rubric, while a specification of the variables involved in the relationship could encompass a full range of social, economic, cultural and proximate factors usually hypothesized to play a causal role in reproductive behavior.

The literature on fertility behavior holds that formal education heightens a person's consciousness on the real and perceived costs and utilities of children (Easterlin, 1980; Kasarda et al., 1986; Kirk, 1996). Educated women will therefore be better equipped to ascertain the economic and other opportunity costs associated with having a child and would therefore, be less inclined to leave the labor force to have a child. Moreover, the norms and values of Western family formation that are communicated in

the workplace tend to create a desire for fewer but quality children which leads to a greater investments on the children (Caldwell, 1980; Caldwell, 1982; Caldwell, Reddy, and Caldwell, 1985; Axinn, 1993). It can be expected then that women with higher education will have a higher desire for smaller family size and a desire for stoppage of childbearing which will be reflected in a higher use of modern contraception.

Research has also focused on the cultural effects of education reflected through exposure of women to new beliefs and values that are incompatible with the traditional roles of women and which consequently motivates them to desire smaller families. Formal education exposes women to beliefs and values that place a high premium on individual advancement, creates awareness of alternative opportunities and life pursuits, and motivates them to develop and pursue interests other than childbearing (Caldwell, 1982; Cochrane, 1983; Westoff, 1992). As women become more educated they are likely to view childbearing as limitation to individual career development and as they realize other ways of attaining status besides bearing children their desire for children will decrease and could result in their adopting modern contraception.

Female education has also been claimed to alter household power relations making women more autonomous and giving them greater control of various dimensions of their lives (Caldwell, 1986; Sathar, 1993). Consequently, such greater control of their lives could be reflected in the independent decision educated women take in adoption of family planning. Where they act independently in fertility matters, they will be less likely to feel that they are disobeying their husbands. Moreover, educated women are more likely to relate with their husbands on an equal level (Mason, 1984; LeVine et al., 1991) and to discuss the decision to adopt family planning together.

An often recurring theme in cultural studies of fertility in sub-Sahara Africa is the role of patriarchy. Among others, patriarchy grants husbands absolute decisionmaking power, forces wives to subordinate their interests to those of the husbands and it maintains a strong desire for large families (Caldwell and Caldwell, 1987; Frank and McNicoll, 1987). Consequently, although sub-Saharan Africa women attend school and greater economic autonomy and freedom of mobility as compared to their counterparts in South and West Asia, they have lesser autonomy in fertility decisions including sexual partnership relationships (Kritz and Gurak; 1989). Patriarchy is also claimed as constraining women from using family planning as their husbands associate it with promiscuity (Bledsoe et al., 1994; Omondi-Odhiambo, 1997). However, when husband and wives' education are considered simultaneously there is no conclusive evidence showing that patriarchy exerts such influence on women use of family planning in sub-Saharan Africa (see, for instance, Uchudi, 2001). This is not a surprising finding because educated men in particular are likely to treat their wives with more equality as they themselves are moving or have moved away from traditional definitions of masculinity. Although educated men may still maintain the leadership role in their homes and retain the prerogative to make fertility decisions (Frank and McNicoll, 1987; Caldwell and Caldwell, 1987; Ezeh, 1993; Omondi-Odhiambo, 1997) they are more likely than uneducated men to behave in accord with middle class and Western family values. This suggests that educated men could be at the forefront of promoting adoption of family planning by their wives due to a desire for quality life for their children underpinned by middle class and western lifestyles which their education affords them.

That there is a strong theoretical and empirical relationship between educational attainment and fertility behaviour is not in question. However, a fundamental issue that has largely been neglected is the change in this relationship across cohorts resulting from improving educational opportunities for women over time. Consistent with the improvement in women educational attainment, there has also been an increase in opportunities in the economic and political institutions of the country and an increasing participation of women in different roles within these spheres. Clearly, the involvement has taken women out of the home environment placing them in situations where they are more inclined to take decisions that are more in accord with individual advancement. For such women, childbearing is no longer a means to status attainment, and the economic and opportunity costs of many children are higher. Consequently, fertility behavior will be significantly different between cohorts for the reason that various cohorts of women benefited differently from improvement in the educational system and expansion of secular opportunities. Moreover, the selected factors affect people of various cohorts differently. For instance culturally, ethnic groups socialize their children differently from each other across time. The socioeconomic developments associated with lower fertility such as the expansion of education and employment opportunities affected each cohort of women differently. These relationships deserve attention in a policy relevant research question such as fertility.

Data and variables

This study utilizes data from the 1998 Kenya Demographic and Health Survey (KDHS); it is the third similar survey in Kenya since the first in 1989. The KDHS is a

nationally representative sample survey of women of reproductive age, 15-49 years. In addition to measuring fertility, mortality and family planning, the survey also collected information on individual and household characteristics, which makes it possible to asses the impact of the latter on fertility behavior. Following the practice of past research on fertility behavior the analysis is restricted to women who were married and not pregnant at the time of the survey. There are two reasons for invoking these restrictions. First, most of the childbearing in sub-Saharan Africa, including in Kenya takes place within some form of conjugal union. Second, women who are pregnant are likely to have fertility preferences that might be inaccurate and while they may be more interested than other women in family limitation, they are unlikely to use any contraception (Amin, Chowdhury and Hill, 1992; Ezeh, 1993; Bankole, 1995; Uchudi, 2001). Out of the 7881 total KDHS sample of women, 80 percent were married, with only 11 percent of these being pregnant. Additionally, of the total 23351 children ever born to the women in the sample, only 9 percent were born to women who had never been married. Using the two criteria, married women and who were not pregnant at the time of the survey to delineate the sample for the study, reduced the initial sample size to 4324 women.

There are two dependent variables in this study: the demand for no more children and the practice of a modern method of contraception. This selection follows past studies of fertility behavior in sub-Saharan Africa (see, for instance, Amin, Chowdhury and Hill, 1992; Shapiro and Tambashe, 1997; Toroitich-Ruto, 2001; Uchudi, 2001; Short and Kiros, 2002). Utilizing information on fertility preferences reported at the time of the survey, the demand for more children has been constructed into a dichotomous measure coded ‘1’ for ‘no more children’ and ‘0’ ‘otherwise’. Similarly, the second outcome

variable is also measured as a dichotomous variable with '1' representing 'use of modern contraception' and '0' 'other responses' . The latter includes non-contraceptors and women who were using traditional methods. This measure is aimed to capture the purposeful behavior hypothesized to be associated with a desire for smaller families among younger educated cohorts. Previous research on fertility has emphasized the need to focus on the demand for no more children and use of modern contraceptive because fertility orientations must first change before a decline in fertility occurs (Omwanda, 1996; Uchudi, 2001; Short and Kiros, 2002). The demand for no more children and the use of modern contraception are also likely to vary across generations and therefore would reflect the ideational change resulting from changing educational attainment across cohorts. Moreover, these behaviours will also indicate the diverse and changing socio-cultural contexts in which women of different cohorts grow.

This study has hypothesized that educational differences in fertility behavior are conditioned by women's generational differences. Consequently, to examine the effect of generational differences in educational attainment on fertility behavior, the sample has been organized into three cohorts based on the age of the woman at the time of the survey (less than 30 years, 30-39 years; 40-49 years). The younger cohort of women in Kenya became adolescents at a time when gender roles were changing, greater flexibility in their definition and when educational and career opportunities were expanding. Consequently, they are more likely to use modern contraception and to express a desire for cease childbearing.

Women's educational attainment is the major independent variable in this analysis. Educational attainment is categorized into three groups: none, primary, and

secondary and higher. The demand for no more children and use of modern contraceptives is expected to be higher among highly educated women. Although there was a reduction in the amount of government expenditure on education in the 1990s, the first two decades after independence were characterized by great growths in the education sector. Thus, women aged below 40 are likely to have benefited from this expansion and consequently the magnitude of the effect of education is likely to be larger among the younger cohorts.

In addition to women's education, there are also other socioeconomic factors that affect fertility behavior in Kenya. These include husband's education, wife's and husband's employment and place of residence. In order to capture the role of culture in fertility, a woman's ethnicity and religious affiliation are also included in the models. An examination of these factors that affect fertility behavior will therefore, enable an isolation of the net effect of women's education and bring greater understanding to the dynamics of childbearing in Kenya. The socioeconomic factors are likely to engender lower fertility through their changing of norms and attitude about the value of children and through exposing women to beliefs and values that promote aspirations for individual advancement (Diamond, Newby and Varle, 1999; Caldwell, 1980; 1982). It is hypothesized that highly educated women are likely to enjoy personal autonomy, hold decision making power in the household including those concerning her fertility, are more likely to break from culturally defined roles that favor high fertility and to relate with their husbands in a more egalitarian manner. Consequently, as compared to women with no or little education, these women are more likely to choose to limit the size of their family and/or use modern contraception.

One mechanism through which education affects fertility behaviour is through delayed entrance into marriage. Since the study is restricted to married women, it is important to control for the age at first marriage as it is inversely related to the exposure to the risk of conception and is an important proximate determinant in most fertility models (Davis and Blake, 1956; Westoff, 1992). Women who marry young are likely to have little or no education and to view childbearing as the means to social acceptance and recognition. Age at marriage is introduced in this analysis as dummies with two categories, less than 20 years and above 20 years. Women who marry late are likely to have different fertility preference and contraceptive practice profile from those who marry young.

The role of husband's education is also examined because it could indicate the breaking of African men from pronatalist attitudes and other patriarchal traditions (Carter, 1999). Educated men are less likely to be patriarchal and may themselves be the ones to encourage their wives to use modern contraception because they desire a quality life for their children. Educated husbands are also less likely to adhere to traditional norms and attitudes about women's position and roles. Moreover, such men are more likely to relate with their wives on an equal footing, to give them a greater say in matters of their own reproduction, to adhere less to traditional dictates that require caring for children of other kin and to concentrate most of the resources in the nuclear family (Carter, 1999). Both husbands' and wives' education is similarly coded: None, primary and secondary and higher.

A woman's fertility behavior will depend on the household's economic status as indicated by the couple's participation and positions in the labour market. For a woman,

her status is influenced both by her husband's and her own position in the productive process and earning structure of the society (Uchudi, 2001). Moreover, participation in the modern economy could be seen as an indication of the couples' and households' adoption of 'middle class values'. Middle class values are associated with depressed fertility motivations because among others they create a desire for self advancement, make people aware of the cost of children associated with modern life and hence, engender a desire for smaller but quality families (Lloyd, 1994). Consequently, it is argued here that among women whose husbands are engaged in higher status occupations such as managerial/professional jobs, there will be a higher desire for cessation of childbearing and a higher likelihood of practicing modern contraception.

Women's own participation in the modern economy is expected to associate with fertility behavior. The mechanisms through which women's employment affects fertility are closely related with education because it is education that determines entry into the work outside the home. Employment influences fertility through delaying marriage, increasing opportunity costs of women's time within marriage, and increasing the costs of children as aspirations increase (Diamond, Newby and Varle, 1999). Employment in the market also brings women into contact with new role models and new ideas and values that enhance a woman's self-worth and autonomy and exposes them to knowledge of women with small families and practicing modern family planning (Uchudi, 2001). Again, the literature shows that whether employment exerts a negative effect on fertility depends not much on the working for cash as the type of employment. Presumably, where the only opportunities are in low-paid, low-status jobs, the only effect may be to delay marriage; fertility preferences may be affected less (Diamond, Newby and Varle,

1999). Both husband's and wife's occupations are constructed as a set of four dummy variables: professionals/managerial; clerical, sales and service; agriculture and not-employed.

The effect of a woman's place of residence is examined because urban women have significantly lower fertility than rural women, with rural women having about 1.8 more births than urban women (Cohen, 1993). Urban women have lower fertility because of superior educational attainment, working in the modern economy, and exposure to new ideas and values through the mass media and ease of access to family planning (Oheneba-Sakyi and Takyi, 1997; Diamond, Newby and Varle, 1999; Montgomery and Lloyd, 1999). Additionally, everything in the urban areas is subject to cash exchange which suggests that urban parents are more aware of the cost of having large families and have roles that are incompatible with childrearing. These factors and conditions are likely to exert a greater influence on women to desire smaller families and adopt family planning. Rural areas have higher fertility due to lower educational attainments, less or no use of modern contraception (Bledsoe et al., 1999; Thomas, 1999) and strict adherence to traditional behaviours that favours larger families.

The fertility behavior of a woman is also conditioned by the ethnic group to which she belongs. Not only does the extent to which education negatively affects fertility depend on the flexibility of the kinship structure to allow educated women to exercise control over fertility decisions that has been traditionally the preserve of male (Mason, 1993), but different ethnic groups have been differentially affected by the expansion in education opportunities. Moreover, fertility behavior such as nonuse of modern contraception, duration of postpartum abstinence, desire for larger families are

underpinned by ethnic traditional norms and values (Page and Lesthaeghe, 1981; Benefo, 1995; Ezeh, 1997), such as a greater preference for male children for old age security and for the sustenance of the lineage. There are about 43 ethnic groups in Kenya, but the DHS collected ethnic information for only a few. In Kenya, the *Kikuyu* are not only considered to be more educated and urbanized, they also reside in a region that enjoys a higher socioeconomic development. Consequently, it is argued that the *Kikuyu* desire fewer children and are more likely to use modern contraception as compared to *Embu/Meru, Kamba, Kalenjin/Maasai, Kisii, Luhya, Luo, Mijikenda/Taita/Taveta* and *Others*.

In addition to a woman's ethnic group her religion is another important socio-cultural factor that is likely to influence her fertility behavior. Besides the school system, religion is perhaps the most influential social institution that constructs expected standards of behavior, shapes attitudes, and hence influences the manner in which individuals act and respond in their socially constructed institutions including the family. Religious affiliation affects fertility behavior through its teachings and practices which shape a woman's beliefs, norms and value orientations including her attitudes toward reproduction and family size (Benefo, 1995; Gregson et al., 1999). Religious affiliation is included in the analysis as dummy variables including, 'Catholics', 'Muslims', 'Protestants', and 'No religion'.

The fertility behavior of interest in this study is the desire for more children and practice of modern contraception, which are likely to be inextricably linked to the number of living children that a woman has ever borne. Studies have demonstrated that the likelihood of using contraception increases with increasing parity (Bertrand et al. 1989; Toroitich-Ruto, 2001), which suggest that they are likely to have achieved their fertility

goals and desire to limit their fertility. Moreover, couples who have a high number of living children are likely to discuss and seek to adopt family planning, and to appreciate more readily the burden of raising a large family. Consequently, it is expected that as the number of living children a woman has increases, her desire for more children will wane and the likelihood of her using modern contraception will increase.

However, the number of children a married woman has is related to her age at marriage. In a high fertility country as Kenya, women's entrance into marriage signals the start of childbearing. Women who marry young are likely to have many children due to longer period of exposure to childbearing. Most analyses have demonstrated that the age women first marry is significantly associated with fertility (see, for instance, Trussell and Bloom, 1983; Westoff, 1992; Shapiro, 1996). Early marriage may also be indicative of low educational attainment and growing in poor socioeconomic household, both of which are likely to engender high fertility. Moreover, it could suggest that such women marry men of low socioeconomic status and hence may not benefit from concomitant effects of education such as marrying more educated and richer men (Rosenzweig and Schultz, 1982; Ware, 1984). The age at marriage was included in the analysis as dummy with two categories; less than 20 years, and above 20 years.

Methods

Since the dependent variables are binary, logistic (logit) regression has been utilised in this multivariate analysis. Logistic regression models are commonly estimated by maximum likelihood, with the *likelihood function* expressing the probability of obtaining the observed sample as a function of model parameters, rather than by least

squares (Hamilton, 1992). For each of the two outcome variables this involved a binary choice model, taking the general form:

$$\text{logit } P=\ln (P/ (1-P) = b_0 +b_1x_1+b_2x_2+b_3x_3+b_4x_4+....b_ix_i+ e,$$

where b_1, $b_{2,}$ $b_{3,}$ b4 and $b_{i,}$ represent the coefficients of each of the predictor variables included in the model; b_0 is the intercept, while e is an error term. ln(P/(1-P) represents the natural logarithm of the odds of the outcome. The output of the SPSS statistical package, which was utilised in this analysis, contains logit coefficients and odds ratios with the latter being logit coefficients which have been transformed through exponentiation. The odds ratios indicate the magnitude of the predictor variable's impact on the probability of the outcome occurring. Additionally, just as in ordinary least squares, the logit coefficients can be interpreted for their significance and direction. The odds ratios are the measure of the odds that a woman's states preference for no more children or adopting modern contraception as indicated by the independent variables. As regards the direction of the logit coefficients, odds greater than one indicate an increased probability that a woman will state a preference for more children or will use modern contraception; while those less than one indicate a decreased probability. On the other hand, a lack of effect or absence of a relationship between the independent variables and the outcome variables is suggested by odds equalling one.

Both outcome variables are a measure of fertility behaviour and therefore the same independent variables are tested in the three nested models. For the pooled sample, the first model estimates the effect of education on fertility behaviour, the second controls for socio-economic variables, while the third adds a woman's ethnic group, religious

affiliation, number of living children and age at marriage. Similar models are conducted to examine the effect of these variables across cohorts.

Results and discussion

In Table 1 the different backgrounds of the married women and their socioeconomic and demographic characteristics by current use of modern contraception and desire for no more children are presented. Over two-thirds of the women in Kenya were not using any modern methods of family planning, while more than half (57 percent) desired to have no more children. The results of the cross-tabulation between the outcome variables (not shown) indicate among those who did not desire another child, 59 percent were not using modern contraception. This is an indication that there is a large unmet need for family planning in the country.

[Table 1 about here]

Table 2 presents the pooled sample regression results of the effect of education and other control factors on the use of contraception. As indicated by the log likelihood ratios and associated chi-squares, the models are statistically significant. The data show that a woman's educational attainment has a positive and robust effect on the use of contraception. The results of model 1 show that as compared with women with no education, women with primary education are more than twice as likely to use modern contraception, while those with secondary or higher education were more than five times as likely to use modern contraceptives as compared with women with no education. However, controlling for other socioeconomic factors including husband's education, woman's and husband's occupation and place of residence in model 2, significantly

reduces the effect of women's education on the risk of her using modern contraception.

The results in model 2 indicate that when control is made for husband's education, husband's and wife's occupation and place of residence, the odds of using modern contraception increase by 85 percent for women with primary education and by 169 percent for women with secondary and higher education as compared to women with no education. These results are consistent with findings elsewhere that show that achieving greater use of contraception would require large amounts of education (Axinn, 1993; Jejeebhoy, 1995; Shapiro and Tambashe, 1997, Magadi and Curtis, 2003). Although the effect of education is robust in both the models, the reduction in absolute effect as other variables are included suggests that the effect of women's education on the use of modern contraception is partly explained through other socioeconomic factors. The education of the husband emerges as an important control factor in this relationship, while place of residence is statistically insignificant. For instance, women whose husband's have secondary or higher education were two and half times more likely to use contraception as compared to those whose husbands have no education. This suggests that although women are achieving equity at school and at work over the years, the structure of the family has remained largely patriarchal and men still retain substantial influence on their wife's fertility behaviour (Ezeh, 1993; Bankole, 1995; Omondi-Odhiambo, 1996; Uchudi, 2001).

The results of the full model show that the wife's and husband's occupation, place of residence, ethnic group and number of living children are also significant. The effect of the wife's occupation is more pronounced in the full model than in model 2. Overall, the pattern of effects of type of occupation is consistent with theoretical expectations;

women who are in professional/managerial and sales/service occupations are more likely to use modern contraception as compared to those in agricultural and manual occupations. For example, women in professional and managerial occupations are 61 percent more likely, while those in clerical and sales occupations are 48 percent more likely to use modern contraception. The fact that the effects of women's occupation on use of contraception are more pronounced than the occupation of the husband shows the importance of women's own participation in the market economy in promoting the adoption of family planning. The significance of women's occupation in the full model validates other theoretical mechanisms through which employment in the market economy influences fertility such as exposure to knowledge on fertility regulation, interaction with new role models, increasing opportunity costs of women's time within marriage, and increasing the costs of children as aspirations increase (Diamond, Newby and Varle, 1999; Uchudi, 2001).

The results also show that as compared to urban residents, rural women are 33 percent less likely to use modern contraception. This suggests that despite efforts to narrow the differences in access to family planning services between rural and urban areas (Omondi-Odhiambo, 1997), access to services could still be more difficult in rural areas. Substantial ethnic and religious differences in use of modern contraception are also evident. Except for the Meru/Embu women, women of other ethnic groups were less likely to use modern contraception as compared to *Kikuyu* women. These results point to differences in adherence to traditional reproductive practices. For instance, the *Luo* are one of the most traditional ethnic groups in Kenya and a group that has suffered most from the HIV/AIDS pandemic, both of which could make them less likely to use

contraception. Further, the results show that three of the five populous ethnic groups in Kenya, including the *Luo, Luhya* and *Kalenjin/Maasai* are less likely to use contraception which could have important implications for future fertility declines.

The results also underscore the importance of attained parity on fertility behavior. As the number of living children a woman has increases, so does the likelihood of her using modern contraception. As compared to women with no child, women with one or two children are eight times, those with three or four, eleven and half times and those with more than five, fifteen times more likely to use modern contraception. These findings add to the evidence from sub-Saharan Africa that women who practice family planning have already attained a high number of children (Bledsoe et al., 1994; Toroitich-Ruto, 2001; Omondi-Odhiambo, 1997; Magadi and Curtis, 2003).

[Table 2 about here]

Table 3 presents the pooled sample regression results of the effect of education and other control factors on the desire for cessation of childbearing. The results show increasing women's education is not positively associated with desire to cease childbearing. The data in model 1 show that having primary education reduces the likelihood that a woman will desire to stop childbearing by 41 percent, while having secondary education reduces this likelihood by 47 percent. Similar results on the relationship between education and fertility preference have been reported in sub-Saharan Africa (see Uchudi, 2001). The results of the other control variables, however, follow the hypothesized pattern. As compared to urban women, rural women are 45 percent less likely to desire to cease childbearing cessation. Demand for more children is higher in rural areas for several reasons. Less educational opportunities for children and little

pressure for child schooling in rural areas make large families attractive because the children provide the much needed farm labor. Except the *Meru/Embu* who are ethnically and culturally akin to the *Kikuyu* all the other ethnic groups exhibit less desire to cease childbearing, with the *Kalenjin/Maasai* being the least inclined to stop childbearing. Although the Kikuyu are more likely to use contraception as compared to other ethnic groups, in a society where values associated with modernization are becoming entrenched little differences across ethnic groups would be expected. The *Kikuyu* are considered to be the most urbanized and educated of the Kenyan ethnic groups, two factors that are associated with desire for less children and higher adoption of family planning. The *Kalenjin/Maasai* have not only remained largely traditional, but they also occupy large tracts of agricultural and pastoral land and are therefore yet to feel the pressure of declining land size associated with population increase.

[Table 3 about here]

In Table 4, we examine the effect of education and other control factors on the use of modern contraception across cohorts; a woman's education is significant through all the models for each cohort. The results show that although higher education associates with higher odds of using modern contraception across all cohorts, the magnitude of effect is greater for the youngest cohort. In the full model (Model 3), for instance, having secondary or higher education increases the odds that a woman will use modern contraception by 200 percent, by 136 percent and by 95 percent for the below 30 cohort, 30-39 and 40-49 cohorts respectively. These results are consistent with the hypothesized pattern of association - a strong positive relationship and therefore a higher likelihood of using modern contraception. Among younger women, the below 30 cohort, controlling

for the effect of husband's education did not reduce the magnitude of her own education below that of her husband's as in the case of older cohorts. The respective odds ratios for secondary or higher husband's education are 2.45, 2.97 and 2.28. Clearly, these results suggest that younger women who are highly educated will make reproductive decisions that are in accord with their own individual aspirations such as the need for career advancement and not those of the husband. The effect of the other control variables was also more pronounced among the younger cohort.

[Table 4 about here]

The regression results for the effect of education and other control variables on desire for childbearing cessation across cohorts are presented in Table 5. Except for the youngest cohort, education does not have any effect on the likelihood that a woman will express a desire for cessation of childbearing across cohorts. These results confirm our hypothesis that the effect of education on fertility behavior will be much more pronounced among the younger women. For example, the results of the last model (Model 3) show that having secondary or higher education is associated with 76 percent increase in the odds that a woman will express a desire to stop childbearing, while having primary education increases the odds by 60 percent.

Religious affiliation, both husband's and wife's type of occupation and age at first marriage did not associate with desire to stop childbearing. Although, urban women are more likely to desire to stop childbearing than rural women, older rural women were less likely to desire to stop childbearing as compared to younger women. The results of the full model (Model 3), for example, show that being a rural woman reduced the odds that a woman will desire to cease childbearing by 77 percent among the oldest cohort, while

the odds were reduced by 46 percent among the youngest cohort. This suggests that younger cohorts are more likely to desire childbearing cessation as compared to older cohorts.

Just as in the practice of modern family planning, the number of living children was associated with increased odds of desiring to stop childbearing across all cohorts. For example, among the youngest cohort (below 30 years), the odds that a woman will express a desire to cease childbearing were about thirty two times for those with three or four children, nine times higher for the 30-39 cohort and only about 2 times higher for the oldest cohort as compared to women with no children. Similarly, younger women with one or two children were six times more likely to desire to stop childbearing as compared to those with no children, while those in the 30-39 and 40-49 cohorts in this category were only twice as likely to express this desire. Evidently, the desire to cease childbearing is much more pronounced among the youngest cohort. Rather than suggesting a change of attitude in favor of smaller families, these results demonstrate that fertility behavior among most women in Kenya as in the rest of sub-Saharan Africa changes only when they have already attained a high parity (Toroitich-Ruto, 2001; Magadi and Curtis, 2003).

The results on a woman's ethnic group do not seem to support this higher desire for childbearing cessation among younger women. Unlike in the case of use of modern contraception where there were little differences across cohorts, the results on ethnic group and desire to stop childbearing indicate that older women of all ethnic groups were more in favor of stopping than younger women. Possible explanations for this is that older women could already have achieved their desired family size or have a higher

number of children and therefore are more conscious of the negative effect of large families. Consequently, they are more likely to express a desire for no more children.

[Table 5 about here]

Conclusion

This paper has examined the effects of education on fertility behavior seeking to establish primarily whether this effect varies across cohorts of women. The results show that there are significant differences across cohorts in the use of modern contraception by education levels. These results indicate that contemporary women use modern contraception as a means to delay childbearing, (Caldwell, 1992; Guilkey and Jayne, 1997; Shapiro and Tambashe, 1997), to allow them to pursue their career aspirations. However, the results attest to findings from other parts of sub-Saharan Africa that demonstrate that it requires at least secondary level of education for married women to have the independence they need to adopt family planning (Shapiro and Tambashe, 1997; Uchudi, 2001). Consequently, continuing changes in women's schooling especially increasing proportions attaining secondary and university education would suggest that family planning prevalence will increase therefore entrenching Kenya's fertility transition.

Although there was no statistical evidence to support the hypothesis that the desire for cessation of childbearing is associated with education for the older cohorts (30-39 and 40-49), higher education was associated with increased desire to cease childbearing for the younger cohort. Additionally, husband's education particularly among the older cohorts was more important in determination of childbearing cessation.

When the relationship between fertility behavior and number of living children is considered the results have shown that for most women behavior change occurs after they have borne three or four children; findings that have also been observed before (Toroitich-Ruto, 2001; Magadi and Curtis, 2003). These results are consistent with earlier research that shows that desire for large families is still strong in sub-Saharan Africa (see for instance, Caldwell et al., 1992; Shapiro and Tambashe, 1997; Uchudi, 2001). The prominence of husband's education also points to the persistence of patriarchy in fertility issues (Frank and McNicoll, 1987; Caldwell and Caldwell, 1987). However, the positive relationship between husband's education and desire for family limitation suggests that contemporary educated African men are likely to be at the forefront in promoting family limitation.

The results of the study also show that women from ethnic groups in which there is strong conformity to traditional reproductive practices including the *Kalenjin/Maasai, Taita-Taveta/Mijikenda, Luo* and *Luhya*, are much less likely to use contraception and to desire to family limitation. It has been suggested that men in these communities possess more power over decisionmaking in major family and community matters including fertility regulation and preferences than their wives, and that their opposition to family planning is due to misconceptions or lack of information (Omondi-Odhiambo, 1997). Therefore, not only do family planning programmes need to take cultural diversity as indicated by ethnicity into account, but policy should also target change of attitudes toward smaller families and to continue efforts to educate women and men on methods of family planning.

A key hypothesis for which support was sought is whether examining fertility behavior across cohorts could indicate the sustenance of Kenya's incipient fertility transition. The results indicate that the youngest cohort of women is more likely to have a lower fertility as indicated by a higher use of contraception and desire to cease childbearing. Even if younger women use contraception to delay their next birth rather than to stop childbearing, in the long run, these women will have fewer children than those who do not using any contraception. However, since use of family planning is still low, policy should seek to achieve more use of contraception, especially among younger women with fewer children. As research from elsewhere in the continent has shown, a critical factor in realizing these goals is enhancing opportunities for young women to remain in school beyond secondary school (Shapiro and Tambashe, 1997; Uchudi, 2001). Consequently, the recent policy change that made universal primary education mandatory in Kenya portends great benefits for women's status advancement and fertility decline as it will ensure that a greater number qualify to join secondary schools. Ultimately, promoting women's education would empower women to make individual decisions and to act on those decisions and increase their participation in secular employment where they are exposed to ideas and attitudes that engender a desire for smaller families and use of family planning.

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Table 1: Percent distribution of use of contraception and demand for no more children by selected characteristics

Variables	Uses modern contraceptives?		Desires no more children?	
Wife's education	**No**	**Yes**	**No**	**Yes**
No education	13.6	2.6	5.2	11
Primary	39.1	18.5	25.7	31.9
Secondary and higher	13.3	12.8	12.3	13.8
Husband's education				
No education	8.6	1.6	3.6	6.6
Primary	35.6	13.7	21	28.2
Secondary and higher	21.8	18.7	18.6	21.9
Living children				
None	5.3	0.3	5	0.6
One/Two	20.8	10.4	23.8	7.4
Three/Four	17.3	10.9	10.7	17.5
Five+	22.7	12.3	3.8	31.2
Wife's occupation				
Agriculture/manual	24	10.8	13.1	21.7
Professional/managerial	2.2	2.8	1.9	3
Sales/service/clerical	12.3	7.8	9.3	10.8
Unemployed	27.6	12.7	19	21.3
Husband's occupation				
Unemployed	2.7	0.6	1.1	2.2
Professional/technical	6	5.6	4.5	7.1
Clerical/sales/service	19.6	11.5	14.3	16.7
Agriculture/manual	37.8	16.3	23.4	30.7
Type of place of residence				
Rural	55.8	26.6	34.6	47.8
Urban	10.3	7.4	8.6	9
Ethnic group				
Taita Taveta/Mijikenda	8.7	2.6	6	5.3
Kamba	6.8	3.4	4	6.2
Kalenjin/Maasai	13.1	4.4	7.8	9.7
Kisii	4.2	3.4	3	4.7
Luhya	10.3	4.2	6.5	8
Luo	10.8	2.3	6.5	6.7
Meru/Embu	2.9	3.5	1.9	4.6
Others	2	1.1	1.2	1.9
Kikuyu	7.1	9	6.3	9.8
Religious affiliation				
Protestant	41.3	22.2	27	36.5
Muslim	4.1	1.6	3.1	2.6
Other	3.6	0.6	2.1	2.1
Catholic	17.1	9.5	11	15.6
Age at marriage				
Before 20 years	45.5	19.7	26.7	38.5
After age 20	20.5	14.2	16.5	18.2
Percent total	66	33.9	43.2	56.8
Sample size	2855	1469	1870	2454

Table 2: Logit results of the odds of using modern contraception (pooled sample)

Variables			
Wife's education	**Model 1**	**Model 2**	**Model 3**
No education	1.00	1.00	1.00
Primary	2.45***	1.85***	1.79***
Secondary and higher	5.01***	2.69***	2.54***
Husband's education			
No education		1.00	1.00
Primary		1.57***	1.53***
Secondary and higher		2.51***	2.60***
Husband's occupation			
Unemployed		0.57**	0.66*
Professional/technical		1.16	1.19
Clerical/sales/service		1.01	0.95
Agriculture/manual		1.00	1.00
Wife's occupation			
Unemployed		0.98	1.20**
Professional/managerial		1.42**	1.61**
Sales/service/clerical		1.12	1.48***
Agriculture/Manual		1.00	1.00
Type of place of residence			
Rural		0.9	0.66***
Urban		1.00	1.00
Ethnic group			
Taita Taveta/Mijikenda			0.35***
Kamba			0.37***
Kalenjin/Maasai			0.31***
Kisii			0.73**
Luhya			0.30***
Luo			0.17***
Meru/Embu			1.22
Others			0.52***
Kikuyu			1.00
Religious affiliation			
Protestant			1.04
Muslim			0.87
Other			0.61
Catholic			1.00
Living children			
None			1.00
One/Two			8.18***
Three/Four			11.62***
Five+			15.36***
Age at marriage			
Before 20 years			0.93
After age 20			1.00
-2 Log likelihood	5315	5226	4751
Chi-square change(df)	226(2)	315(11)	791(26)
Model significance	0.000	0.000	0.000
Sample size		4324	

Significance: *** p<0.000 ** p<0.01 * p<0.05 ! p<0.10

Table 3: Logit model results of the odds of demand for no more children (pooled sample)

Variables and their categories			
Wife's education	**Model 1**	**Model 2**	**Model 3**
No education(Ref)	1.00	1.00	1.00
Primary	0.59***	0.61***	0.73
Secondary and higher	0.53***	0.53***	0.81
Husband's education			
No education(Ref)		1.00	1.00
Primary		0.90	0.98
Secondary and higher		0.87	1.12
Husband's occupation			
Unemployed		1.57**	1.69**
Professional/technical		1.42***	1.1
Clerical/sales/service		1.04	1.04
Agriculture/manual (Ref)		1.00	1.00
Wife's occupation			
Unemployed		0.68***	0.89
Professional/managerial		1.05	1.13
Sales/service/clerical		0.77***	0.85
Agriculture/Manual(Ref)		1.00	1.00
Place of residence			
Rural		1.179!	0.55***
Urban (Ref)		1.00	1.00
Ethnic group			
Taita Taveta/Mijikenda			0.36***
Kamba			0.89
Kalenjin/Maasai			0.39***
Kisii			0.62**
Luhya			0.48***
Luo			0.49***
Meru/Embu			1.43!
Others			1.35
Kikuyu (Ref)			1.00
Religious affiliation			
Protestant			0.98
Muslim			0.60
Other			0.70
Catholic (Ref)			1.00
Living children			
None(Ref)			1.00
One/Two			2.71***
Three/Four			16.53***
Five+			98.65***
Age at marriage			
Before 20 years			1.01
After age 20 (Ref)			1.00
-2 Log likelihood	5871	5814	4112
Chi-square change(df)	45(2)	102(11)	1804(26)
Model significance	0.000	0.000	0.000
Sample size		4324	

Significance: *** p<0.000 ** p<0.01 * p<0.05 ! p<0.10

Table 4: Logit model results of the odds of using modern contraception by cohort

Variables	Below 30			30-39 cohort			40-49 cohort		
Wife's education	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
No education(Ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Primary	3.24***	2.62***	2.22***	2.44***	1.85***	1.53**	2.87***	2.13***	1.86***
Secondary and higher	6.61***	3.93***	3.02***	4.97***	2.78***	2.36***	5.98***	2.51***	1.95*
Husband's education									
No education(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.57	1.46		1.81***	1.65**		1.59*	1.44
Secondary and higher		2.56***	2.45***		3.29***	2.97***		2.34***	2.28
Husband's occupation									
Unemployed		0.47!	0.53		0.79	0.95		0.48	0.57
Professional/technical		1.00	1.13		0.87	1.00		2.03**	2.12***
Clerical/sales/service		0.96	0.90		0.96	0.94		1.15	1.11
Agriculture/manual(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Wife's occupation									
Agriculture/manual		0.94	0.76*		0.95	0.88		1.13	0.99
Professional/managerial		1.50	1.48		1.13	1.27		1.55	1.92!
Sales/service/clerical		1.09	1.15		1.07	1.34!		1.17	1.30
Unemployed(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Place of residence									
Rural		0.76*	0.56***		0.95	0.79		1.13	0.82
Urban(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Ethnic group									
Taita Taveta/Mijikenda			0.37***			0.28***			0.41***
Kamba			0.30***			0.43***			0.34***
Kalenjin/Maasai			0.31***			0.28			0.37***
Kisii			0.576**			0.74			1.25
Luhya			0.30***			0.30***			0.30***
Luo			0.15***			0.19***			0.16***
Meru/Embu			1.21			1.26			1.11
Others			0.45**			0.61			0.68
Kikuyu(Ref)			1.00			1.00			1.00
Religious affiliation									
Protestant			1.03			0.97			1.22
Muslim			0.82			1.18			0.52
Other			0.36			0.56			1.24
Catholic(Ref)			1.00			1.00			1.00
Living children									
None(Ref)			1.00			1.00			1.00
One/Two			7.90***			494.93			2.987
Three/Four			10.31***			908.33			4.184
Five+			14.26***			957.62			8.18*
Age at marriage									
Before 20 years			0.82!			1.07			0.88
After age 20(Ref)			1.00			1.00			1.00
-2 Log Likelihood	2272	2231	2006	1958	1920	1766	1043	1013	926
Chi-square	79(2)	120(11)	344(26)	88(2)	125(11)	280(26)	71(2)	102(11)	188(26)
Model significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sample size		1906			1526			892	

Significance: *** p<0.000 ** p<0.01 * p<0.05 ! p<0.10

Table 5: Logit model results of the odds of demand for no more children by woman's cohort

Variables	Below 30			30-39 cohort			40-49 cohort		
Wife's education	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
No education(Ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Primary	1.38	1.38	1.60!	1.41*	1.19	1.02	1.83**	1.55	1.23
Secondary and higher	1.26	1.24	1.76!	1.21	0.98	1.23	1.57	1.20	0.73
Husband's education									
No education(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		0.83	1.02		1.77***	1.54!		1.59	1.06
Secondary and higher		1.05	1.44		1.96***	1.76**		1.61	1.22
Husband's occupation									
Unemployed		1.00	1.25		1.88	1.90		1.89	1.80
Professional/technical		1.17	0.87		1.07	1.04		1.26	1.23
Clerical/sales/service		0.92	1.10		1.01	0.93		0.67	0.73
Agriculture/manual(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Wife's occupation									
Agriculture/manual		1.31**	1.08		1.19	1.03		1.71!	1.20
Professional/managerial		0.65	0.66		0.99	1.44		1.32	1.40
Sales/service/clerical		0.79!	0.74		0.97	1.08		1.51	1.27
Unemployed(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Place of residence									
Rural		0.82	0.54***		1.11	0.46***		0.60	0.23**
Urban(Ref)		1.00	1.00		1.00	1.00		1.00	1.00
Ethnic group									
Taita Taveta/Mijikenda			0.68			0.24***			0.79
Kamba			0.94			0.88			1.08
Kalenjin/Maasai			0.50***			0.32***			1.82
Kisii			0.72			0.64			0.75
Luhya			0.45***			0.36***			2.16
Luo			0.40***			0.36***			1.69
Meru/Embu			1.45			1.92!			3.46
Others			1.31			0.87			6.50
Kikuyu(Ref)			1.00			1.00			1.00
Religious affiliation									
Protestant			0.96			1.03			0.71
Muslim			0.61			0.53			0.24
Other			0.64			1.24			0.21
Catholic(Ref)			1.00			1.00			1.00
Living children									
None(Ref)			1.00			1.00			1.00
One/Two			5.55***			2.17			2.04
Three/Four			31.62***			9.42***			2.36!
Five+			106.58***			40.56***			9.87***
Age at marriage									
Before 20 years			1.02			1.61***			1.41
After age 20(Ref)			1.00			1.00			1.00
-2 Log Likelihood	2288	2270	1850	1828	1814	1467	505	494	427
Chi-square	3(2)	20(11)	440(26)	5(2)	19(11)	364(26)	5.5(2)	17(11)	83(26)
Model significance	0.253	0.04	0.000	0.079	0.06	0.000	0.065	0.120	0.000
Sample size		1906			1526			892	

Significance: *** p<0.000 ** p<0.01 * p<0.05 ! p<0.10